MARCH 1990

ELECTRIC LIGHT & POWER

EL&P

Volume 68, Number 3
A PENNWELL PUBLICATION

VOICE OF THE ELECTRIC UTILITY INDUSTRY

'New source' standards apply to renovations

Wisconsin Electric petitions for rehearing on Port Washington case

Mark T. Hoske
News Editor

MILWAUKEE—If a petition for rehearing fails in WEPCo vs. EPA, utilities choosing to renovate aging coal plants may be bound by New Source Performance Standards (NSPS).

Plant life extensions previously avoided NSPS. The precedent-setting, Jan. 19 decision by Chicago's 7th U.S. Court of Appeals centered on a proposed $71-million renovation of Wisconsin Electric Power Co.'s Port Washington Power Plant.

The decision tightens Environmental Protection Agency clean-air regulations and could double the price for similar renovations by requiring utilities to add emission-control equipment. Rather than perform these costly modifications, utilities may choose instead to close such plants.

Port Washington's fate is still uncertain. WEPCo is reviewing another part of the decision with EPA officials to see if the Port Washington renovation still would be cost-effective. There is no clear indication of when the request for rehearing or talks with the EPA would yield more information.

WEPCo's Jackie Olson explained that the utility asked the judges in the seventh circuit to review the decision that NSPS apply to the Port Washington project modifications.

On the related matter of Prevention of Significant Deterioration, the court agreed that the EPA had ignored Port Washington's operating history in measuring its total emissions over one year. Olson called this part a victory, adding that the EPA had based emission estimates on around-the-clock operation rather than operating history. WEPCo plans to meet with EPA officials to assure that operations at Port Washington fall within allowable PSD standards.

Wisconsin Electric Power Co.'s Port Washington Power Plant renovation awaits further discussion with the Environmental Protection Agency and a petition for rehearing. If the decision stands, the EPA is likely to hold similar life extension projects to New Source Performance Standards.

Renovation still questionable

The outcome of the discussion with EPA and the request for rehearing will determine if the Port Washington units will be renovated as proposed.

"We're pleased the court upheld the PSD decision. We think there's room for interpretation in discussions with the EPA. We're hopeful we can keep some, if not all of the plant operating," Olson said.

On the NSPS portion of the decision, "We're hearing from other industry sources that it will have broad application," Olson said. "We're equally concerned."

Proposed work

WEPCo's Port Washington plant renovation involves $71 million of work on turbine-generators, boilers, mechanical and electrical auxiliaries, and common plant-support facilities for all five units.

WEPCo argued that even though the renovations restore lost capacity, they would not extend the units past their original design life, and so should not be held to NSPS, according to Walter T. Woelfle, WEPCo counsel.

The utility proposed the renovation to state regulators in July 1987. The Wisconsin Department of Natural Resources asked the EPA to concur that the renovation work would not fall under NSPS or PSD regulations.

The EPA said in October 1988 that the renovation is subject to all Clean Air Act requirements. Efforts to work out the matter failed, and WEPCo later took it to court.

Budget: DOE +6.4%; efficiency gains 78%; climate studies +57%

WASHINGTON—The Bush fiscal year '91 budget increases funding for environmental programs, efficiency, and global climate change study; and pushes budget balancing. Bush will ask for an NRC user fee hike to 100%.

Multi-agency funding for studying global climate change totals $1.034 billion, up 57 percent.

The Department of Energy budget request, $17.48 billion, is a 6.4-percent increase over fiscal year (FY) 1990. FY91 starts in October.

Public input at the National Energy Strategy (NES) hearings resulted in a 78-percent increase in the energy efficiency and renewable energy funding request; that's an 8-percent hike over the FY90 appropriation by Congress.

Listen to the people

Secretary of Energy Admiral James Watkins said that the energy hearings reveal "broad consensus for increased emphasis on energy efficiency improvements and renewable energy."

"This is a marked change in direction for DOE in this important area. Using energy more efficiently, and developing

Continued on page 4

LATE NEWS

Entergy's New Orleans Public Service Inc. agreed in principle to sell the gas and electric utility assets to the city. No details were available. A July '89 deal had fallen through.

California PUC Division of Ratepayer Advocates advised regulators to reject the proposed merger of SCEcorp and San Diego Gas & Electric, saying the level of ratepayer savings is questionable.

Pinnacle West Capital Corp. restructured $650 million in debt and signed an interim refinancing agreement skirting a Chapter 11 filing; federal regulators placed MeraBank into receivership.

Alternate acid rain proposal unites split industry views

WASHINGTON—One voice unites the industry in an alternate proposal to the Administration's clean-air legislation.

In a rare move, the Edison Electric Institute, American Public Power Association and National Rural Electric Cooperative Association endorsed a single alternate proposal, which relies on free-market principles, offers more flexibility, and costs less than President Bush's version.

How emissions are cut to target levels is the major difference in the proposal from legislation under consideration.

Too late for impact?

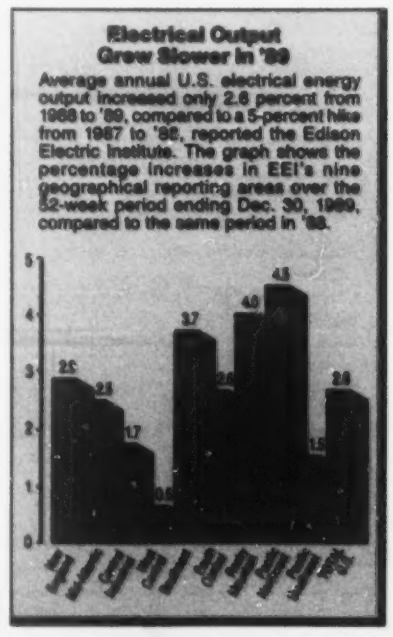
The compromise was drafted during the congressional recess. But some observers say this alternate proposal may have arrived too late in the process to have any significant impact on Congress. In its first day back, the Senate took up S.1630, its version of the Bush clean air proposal. House committees are entangled in the acid rain portion of H.R.3030, a point of debate since the fall of last year.

One congressional-committee aid called the proposal credible and viable, but said it didn't appear that it was being taken seriously as of mid-February.

The EEI/APPA/NRECA proposal offers more flexibility by allowing an averaging of emissions among utilities in three ways: 1) company-wide average; 2) statewide average; or 3) a holding company or power pool average.

Leaders of the industry groups for investor-owned utilities, municipal utili-

Continued on page 8


Electrical Output Grew Slower in '89
Average annual U.S. electrical energy output increased only 2.6 percent from 1988 to '89, compared to a 5-percent hike from 1987 to '88, reported the Edison Electric Institute. The graph shows the percentage increases in EEI's nine geographical reporting areas over the 52-week period ending Dec. 30, 1989, compared to the same period in '88.
5
4
3
2
1
0
2.6
2.3
1.7
0.2
3.7
2.6
4.0
4.3
1.5
2.8

RESERVED FOR MAILING LABEL

NEWS BRIEFS

JILL MINNER, Special Projects Editor

KPL Gas reorganizes

KPL Gas Service said it has reorganized along a "line of business" format in order to make the company as customer and safety-oriented as possible. Under the reorganization, which went into effect this month, there are six main divisions: natural gas operations, electric operations, administrative operations, financial services, law, and communications. "With this line of business format, we are focusing authority so the president of each division is directly responsible for the operational people under him. There is no layer of management between. This narrows our focus and makes senior management directly responsible for providing the safest and most reliable electricity and gas to our customers," explained William E. Brown, newly appointed president and chief operating officer of the electric operations division. Others named to head the new divisions include: William L. Johnson, natural gas operations; A. William Woelhof, administrative operations; Steven L. Kitchen, financial services; John K. Rosenberg, law; and Edward H. Schaub, communications.

Met-Ed asks PUC to approve competitive procurement program

Metropolitan Edison Co. said it has asked the Pennsylvania Public Utility Commission to approve its pilot Competitive Procurement Program for buying additional non-utility generated electricity in the future, to meet growing demands. According to Met-Ed, the program would ensure that available power is purchased from "high-quality suppliers" at the lowest possible cost. Met-Ed said it would be the first electric utility in Pennsylvania to formally introduce competition into the electric power supply business. If approved, electricity would not be purchased under this program until the mid-1990s.

LCRA initiates refund of surplus revenues

The Lower Colorado River Authority (LCRA) was granted interim approval by the Texas Public Utility Commission to voluntarily refund $3 million to its wholesale customers. LCRA said the refund is unprecedented because it would be the first time a Texas utility, public or privately owned, has ever initiated a refund of unexpected excess revenues. The surplus of revenues was earned during recent record cold weather in December, according to LCRA. "This is a tremendous initiative for a utility to try and help its customers with the enormous electric bills that result from an extraordinary cold snap," stated LCRA General Manager David Freeman. "We wanted to prove that we mean it when we say we're a non-profit utility. The revenues earned during December were so far above cost or anything expected that to refund the extraordinary surplus, we feel, is the proper thing to do." LCRA said it has proposed a 10-percent credit for its customers against their December electric bills. However the city of Bastrop has objected to the distribution formula. The objection prompted the PUC's interim approval, to allow Bastrop more time to decide if it wants a full hearing on the issue. LCRA said Bastrop and other customers claim that they are entitled to a larger share of the refund due to their conservation efforts.

Oregon PUC literature keeps public informed

The Oregon Public Utility Commission said it is offering two new publications to help utility customers better understand how the rate-setting process works and how the public can learn more about the PUC. A fact sheet, "How Utility Rates are Determined," explains steps in utility rate cases, how the public may participate in rate cases, and what the commission considers when making rate decisions. The other publication, a Public Involvement Guide, provides an overview of the PUC's responsibilities, descriptions of publications available, and names and phone numbers of PUC departments and administrators.

NCA forecasts U.S. coal outlook for 1990

Electric Utility Statistics

	1987	1988	1989■	1990▲
Generation by:				
Coal	56.9	56.9	56.2	55.9
Oil/Gas	15.2	14.8	14.7	13.6
Nuclear	17.7	19.5	19.1	19.7
Hydro	9.7	8.3	9.6	10.4
Other	0.5	0.4	0.4	0.4
Electricity Growth Rate	3.4	5.0	2.0	1.6
GNP Growth Rate	3.4	3.9	2.9	1.7
Coal Consumption	718	758	763	772

Source: National Coal Association ■ Estimate ▲ Forecast

By the end of 1990, coal production will reach 997 million tons, 22 million tons higher than 1989 levels, according to the National Coal Association. In its annual forecast, NCA predicts that coal consumption at utilities will total 772 million tons, a 1.2-percent increase over 1989. The association also estimates that this year electric generation will increase by 1.6 percent, and that coal's share will drop slightly to 55.9 percent, due to the continued comeback of hydro generation and growth in nuclear generation. While nuclear's share is expected to reach at least 19.5 percent, oil's share will not be as high as it was in early 1989. Oil's high share was due to very low prices at the end of 1988 and the unavailability of nuclear power in the east, according to NCA.

Consumers Power says make hydro study part of relicensing process

Consumers Power Co. has proposed that a socioeconomic study into the impact of hydroelectric generating facilities on the public be included in the federal relicensing process. The utility, which has 11 hydroelectric plants up for new federal licenses, said it has submitted its proposal to the Federal Energy Regulatory Commission. "This is a major step in Consumers Power Company's effort to obtain new licenses for these hydroelectric plants," stated Gordon L. Heins, senior vice president for energy supply at Consumers Power. "By this step, we are saying that the impact these hydro facilities have on people—on their quality of life, their livelihood, their recreation, their communities—must also be considered as part of the overall licensing effort," Heins explained. The studies will take place in 1990 and will later be presented during public workshops in communities near the hydro dams, according to the utility.

Control Data renames energy mgmt. division

Control Data Corp. announced that it has renamed its energy management division Empros Systems International. The company said the changed name—which is ancient Greek for "out in front"—will enable it to enhance its identity, further strategic objectives, and maintain a leadership position as a supplier to the electric utility industry.

Applications available for Baldridge award

Applications are currently available for the 1990 Malcolm Baldridge National Quality Award, and the deadline for submitting applications is April 25, according to the Baldridge Award office. The 44-page booklet, "Application Guide 1990," contains a description of the award, an application form, instructions and recommendations for applicants, scoring criteria and examination information. "We made the 1990 award documentation more user friendly," said Curt W. Reimann, director of the Baldridge Award Program at the Commerce Department's National Institute of Standards and Technology. "Also we fine-tuned the key excellence indicators of major importance to manufacturing and service companies. We tried to help both potential applicants and the thousands of organizations who will use the award criteria as a tool for assessing their total quality management," he added. Copies of the guidelines can be obtained by writing Malcolm Baldridge National Quality Award, NIST, Building 101, Room A1123, Gaithersburg, MD 20899.

Topham is president, CEO of UP&L division

Verl R. Topham has been named president and chief executive officer of the Utah Power & Light division of PacifiCorp's electric operations. Topham, who was previously executive vice president of the division, succeeds the retiring Frank N. Davis. In addition, John A. Bohling has taken over Topham's position as senior vice president responsible for Utah Power's customer operations.

OPPD names chairman

The Omaha Public Power District has appointed Fred J. Ulrich chairman of the board. Ulrich joined the OPPD Board in 1986 and became vice chairman in January 1988. Other officers named to the board include: Frank J. Wear, vice chairman; Michael J. O'Hara, secretary; and John K. Green, treasurer.

Hydro plant logs 2646 days without an injury

The Kings River Conservation District Pine Flat Power Plant has reported working a total of 2646 days without a lost-time injury. According to the district, personnel at the hydroelectric generating plant have received a number of safety awards for their efforts. The Pine Flat Power Plant consists of three, 56-MW units and has 22 employees.

Utilities fined by NRC

The U.S. Nuclear Regulatory Commission recently proposed the following fines:

Consolidated Edison Co.
A $50,000 fine for an alleged violation of NRC emergency planning requirements at the Indian Point Unit 2 nuclear power plant.

GPU Nuclear Corp.
A $50,000 fine for alleged violations of NRC requirements for protection of workers from radiation at the Three Mile Island Unit 2 nuclear plant.

Iowa Electric Light & Power
A $50,000 fine for failing to fully correct previously identified electrical safety violations at the Duane Arnold Energy Center.
Also, a $25,000 fine for failing to adequately test the integrity of the building surrounding the reactor containment.

IN THIS ISSUE

INDUSTRY NEWS

WEPCo seeks clarification on court's EPA decision. 1
Bush budget numbers bounce around Washington. 1
EEI, APPA, NRECA unite on alternate acid rain proposal. 1
Nevada, U.S. enter Yucca Mountain legal battle. 3
Focus report on wheeling looks at technical, regulatory and policy issues affecting transmission line service. 12

T&D TECHNOLOGY

Insulator flashovers can be reduced through redesign and coatings. 35

GENERATION TECHNOLOGY

Ontario Hydro bucks nuclear trend in its 25-year plan. 21

REGULAR FEATURES

Commentary 4
Information/Control Systems 18
Calendar 19
Financial Performance 30
Labor/Management Concerns 34
Rate Activity 35
Bulletin Board 36
New Products 42
Readers' Service 43
Regulatory Review 47
Management Methods 48

Winter bills increased far less than consumer prices

WASHINGTON – Residential electric bills increased about 0.4 percent during winter 1988-89 over the previous year, compared to a 4.4-percent hike in the Consumer Price Index, said the National Association of Regulatory Utility Commissioners.

8.07¢/kWh average for 500 kWh

The average nationwide cost for the period was 8.07 cents/kilowatthour, compared to 8.04 cents for the previous period, according to the 11th winter residential electric bill survey.

Average Northeast regional rates (10.7 cents/kilowatthour for 500 kWh) and Pacific Southwest (9.4 cents) rates were the most expensive while those of the Northwest (5.5 cents) and Rocky Mountain (7.3 cents) were least expensive.

Rates varied nearly 300 percent from high to low. Consolidated Edison Co. of New York had the highest average cost at 12.8 cents/kilowatthour. Washington Water Power Co. in Idaho had the lowest at 4.2 cents/kilowatthour.

In 12 service territories, customers paid an average of 11 cents or more per kilowatthour. In 27 areas, they paid 6 cents or less. Actual consumer costs depend on the usage level and applicable state sales tax.

The survey covers 187 territories for December, January and February for 250, 500, 750 and 1000 kWh.

Copies

A copy of the 210-page report may be obtained from NARUC, P.O. Box 684, Washington DC 20044, for $18.50.

Twelve Most Expensive Service Territories

Company	State	Avg. Cost Cents/kWh	Winter 1988-89 National Rank
Consolidated Edison Co. of N.Y.	New York	$0.128	1
Kauai Electric Co.	Hawaii	$0.126	2
Philadelphia Electric Co.	Pennsylvania	$0.123	3
Long Island Lighting Co.	New York	$0.122	4
Orange & Rockland Utilities, Inc.	New York	$0.121	5
Northern Indiana Pub. Service Co.	Indiana	$0.117	6
Hawaii Electric Light Co.	Hawaii	$0.117	7
Ohio Edison Co.	Ohio	$0.113	8
Commonwealth Edison Co.	Illinois	$0.112	9
United Illuminating Co.	Connecticut	$0.111	10
Atlantic City Electric Co.	New Jersey	$0.111	11
Nantucket Electric Co.	Massachusetts	$0.110	12

Twelve Least Expensive Service Territories

Company	State	Avg. Cost Cents/kWh	Winter 1988-89 National Rank
Washington Water Power Co.	Idaho	$0.042	187
Washington Water Power Co.	Washington	$0.043	186
Pacific Power & Light Co.	Washington	$0.043	185
Potomac Electric Power Co.	Dist. of Col.	$0.045	184
Idaho Power Co.	Idaho	$0.045	183
Idaho Power Co.	Oregon	$0.048	182
Portland General Elec. Co.	Oregon	$0.051	181
Kentucky Utilities Co.	Kentucky	$0.052	180
Minnesota Power & Light Co.	Minnesota	$0.052	179
Puget Sound Power & Light Co.	Washington	$0.053	178
Nevada Power Co.	Nevada	$0.054	177
Edison Sault Electric Co.	Michigan	$0.055	176

Northern Indiana PS eliminates 300 jobs

HAMMOND, IN – Northern Indiana Public Service Co. is eliminating 16 percent, about 300 of 1800, nonunion positions at all levels.

Retirement packages were taken by 164 employees; 130 were cut. The accompanying reorganization reduces the number of nonunion workers from 1824 to 1530.

The restructuring of the company's five business units will eliminate several levels of management, and consolidate or cut a number of departments that don't fit the company's future plans. Areas affected include energy distribution, corporate marketing, electric supply, gas operations and the corporate support group, which includes financial and administrative functions.

Early retirements were offered through Feb. 9; eliminations and tranfers were to be determined after that. A severance package and counseling accompany severence.

Gary L. Neale, president and chief operating officer, described the restructuring.

"We must change to become more responsive to customer needs for cost-effective, environmentally sound energy service and adapt to a more competitive energy environment in the '90s," he said.

Nevada sues over Yucca site; DOE says suit is without merit

WASHINGTON – The Department of Energy called Nevada's lawsuit against DOE's Yucca Mountain site characterization without legal merit.

The lawsuit, filed in Ninth U.S. Court of Appeals in San Fransisco, asks for an order to terminate site characterization for a high-level waste respository at Yucca Mountain.

In a statement the DOE said it has been "conscientiously attempting to carry out a law enacted by Congress in 1987 that requires DOE to characterize the Yucca Mountain site ... The State's actions have frustrated DOE from carrying out the will of Congress."

Previously the state announced it would return unapproved permit applications filed with the State by DOE in early 1988. DOE is caught in the middle – federal law requires site characterization, but also that it obtain permits from Nevada to do the work.

Secretary Watkins said DOE would not seek legislative relief if the lawsuit with Nevada bogs down, but stay in the courts, according to an account in the *EEI Washington Letter*.

Last uranium closes in New Mexico

In news on the other end of the nuclear fuel cycle, the last uranium mine in New Mexico ceased production in January due to low prices.

Competition in the spot market by Canada, China and the U.S.S.R. has cut spot market prices as low as $10 per pound, less than a quarter of the 1978 price. About 55 mines were operating in the state then.

Comanche peak unit reaches low power

DALLAS – Texas Utilities Co. received a low-power license for one unit of the Comanche Peak nuclear plant, loaded fuel and expected to start low-power testing before the end of February.

Questions resolved

The Nuclear Regulatory Commission said questions about design and construction issues that led to suspension of the licensing process in January 1985 were resolved. The second unit is about 85-percent complete and is expected to be finished in 1992.

Milestone

"This is the most important milestone to date for Comanche Peak," said Erle Nye, TU Electric chairman. "It is the first step toward commercial operation of a plant that will provide needed generating capacity and fuel diversity, as well as continued service reliability for our customers."

The price of the two-unit plant is $9.1 billion. Previously, TU settled issues with an activist group and purchased three other owners' shares' settling litigation. Construction began in 1973.

Seabrook license is expected soon

SEABROOK, NH – Seabrook operators expect the Nuclear Regulatory Commission to grant a full power license by the end of February.

On Jan. 18, the NRC staff recommended licensing (*EL&P*, Feb., p.3).

After a two to three month power ascention program, full-power operation on the 1150-MW reactor would be expected in late spring or early summer.

Consumers Power starts buying power under new contract

JACKSON, MI – Consumers Power Co. began buying electricity from a Michigan hydroelectric generating plant as the first purchase under the terms of a contract filed with the Michigan Public Service Commission (MPSC).

The 230-kW Morley Hydroelectric Generating Plant on the Little Muskegon River in the Village of Morley is selling its entire output to Consumers under a long-term contract signed January 1987.

Consumers also is purchasing electricity from 18 other cogenerators and small power producers under previous contracts.

Helping meet demand

Said Gordon L. Heins, Consumers senior vice president of energy supply, "The Morley hydo dam, and other independent and small power projects under development in Michigan, will provide much-needed electricity to help meet the increasing demand for power in Michigan."

Commission actions

MPSC reaffirmed key findings of its cogeneration policy for Consumers' service territory in January but required the company to take action consistent with the findings in its application for approval of its 1990 plan and in its factors for recovering its power supply costs. The commission's Sept. 26, 1989, order reaffirmed the prior findings of an avoided capacity rate of 3.77 cents and the amount of capacity authorized (1160 MW) in its Case No. U-8871, et al.

MPSC also did not limit capacity supplied by any one project, which meant that Consumers could buy more capacity from the Midland Cogeneration Venture Limited Partnership (MCV) than the previous 638-MW limit.

In order to provide ratepayer protection, however, the comission also ordered that capacity payments for projects using natural gas or oil be back-loaded by 40 percent, commencing in 1990 at 2.26¢/kWh.

What Consumers wants

In late January, Consumers filed a motion for relief to implement the MPSC Dec. 21 order concerning cogeneration and small power projects in the company's service territory.

The filing dealt with the potential impact on customers and shareholders of a national financial accounting standard (SFAS 92) in the commission's order.

Plans to implement

With resolution of the accounting issue, Consumers plans to implement the order, which, it says, would result in a one-time, after-tax write-off of $240 million from the reevaluation of the utility's notes from $1.55 billion to approximately $1.22 billion. These notes relate to assets transferred from Consumers to MCV.

In addition, on Jan. 31, the Federal Energy Regulatory Commission planned to consider MCV's application for recertification of its cogeneration project.

EPA may gain status

WASHINGTON – President Bush said he would not oppose legislation that elevates the Environmental Protection Agency to cabinet-level status.

Two such bills now in Congress include provisions to make a bureau of environmental statistics and create a federal commission to conduct a two-year study of how environmental issues should best be handled by the federal government, according to the Jan. 29 *NEMA Washington Report*.

The reference numbers are H.R.3847 and S.2006.

COMMENTARY

Single industry proposal offers economic air cleanup

Congress should stop, look, and listen! It's about to railroad the people who know air quality improvement best. Congress is under the misconception that it knows more about the solution to the problem than you do!

In a cooperative move, the Edison Electric Institute, American Public Power Association and National Rural Electric Cooperative Association have endorsed an alternate clean-air proposal based on free-market principles, flexibility and lower costs than the administration's bill (see p.1).

If Congress is short-minded enough to insist on clean-air legislation prior to release of the results of the $600-million National Acid Precipitation Assessment Program next September, it would do well to recraft current legislation to fit this joint proposal. After all, these groups represent the people who are obliged—legally mandated—to responsibly provide safe, reliable service to electricity customers. And, by and large, they are the people who have been cleaning stack effluents already. They know the problems, the technologies to solve them and the many trade-offs involved.

In the past, when Congress has acted as if it knows more about technical subjects than those dealing with it on a day-to-day basis, and has acted without their concurrence and agreement, the new laws have becomes a prescription for disaster for the American consumer.

If Congress really believes it must prescribe specific cures for our various environmental problems, it should at least wait, like any responsible doctor, until all test results are in and the true nature, severity and causes of the malady are scientifically defined before prescribing the cure....

We urge you to write your senators and representatives...and to do it NOW. Tell Congress it's time to stop acting as if it is all-seeing and all-knowing. Tell them to listen to the people who know pollution control and air quality management best...YOU.

'We'...little word, big meaning

Investor-owned electric utilities, municipal electric departments and rural electric co-ops today are more allied than at any time in my recollections...and I've been around this industry for more than 35 years. This unexpected mark of maturity bodes well for all.

For years, considerable oratory—to say nothing of time and money—was devoted to arguing against "the other guys." Giant investor-owned utilities were pictured as just waiting to pounce on tiny co-ops and devour them in an insatiable lust for growth. Cheap loans to rural electric organizations were declared to be undermining the very essence of business in America, to say nothing of burdening the federal budget. Public power leaders screamed "takeover," and how the "yardstick" of publicly funded electric utilities showed how I-O-Us were "stealing" money from their customers.

The environment has changed. At the recent annual convention of the National Rural Electric Cooperative Association, more than 12,700 delegates were told about the challenges, opportunities and problems confronting the electric industry...and in terms of *we* and *they*. *We* meant all of us in electric power...co-op directors and managers, public power organizations and investor-owned electric companies. *They* were politicians, pressure groups and special interests.

There was focus on the real issues that will decide how successfully the electric industry will meet the demands of future customers...no hollow boasting of pureness of spirit or rightness of cause...no wasted time and energy in political posturing...just straight-forward descriptions of the magnitude of the job to be done, and how it can be accomplished. NRECA executive vice president and general manager Bob Bergland and his staff are to be congratulated for the quality of the program.

Co-ops, municipal utilities and power companies still disagree about elements of their philosophies. But they're the kinds of disagreements everyone, like family, can live with and work toward resolution.

We is a very small word. But its implications for the power industry are enormous.

EL&P ELECTRIC LIGHT & POWER
1250 S. Grove Ave., Barrington, IL 60010

Arthur L. Rice, Publisher
Robert A. Lincicome, Editor-in-Chief

PennWell PUBLISHING COMPANY
708-382-2450
Fax: 708-382-2977

Henry Stein, Senior Editor/Generation
H. Wayne Beaty, Senior Editor/Transmission/Distribution
Mark T. Hoske, News Editor
Jill F. Minner, Special Projects Editor
Dianne Wilson, Editorial Assistant/Products/Literature
William Kenworthy, Legal/Regulatory Editor
Ted Pollock, Management Editor
Richard D. Alaniz, Labor/Management Editor

ELECTRIC LIGHT & POWER (USPS 648-240) is published monthly by the PennWell Publishing Company, 1421 S. Sheridan Road, Tulsa, OK 74112. Copyright 1990 by PennWell Publishing Company. All rights reserved. Officers of PennWell Publishing Company and Publication: Chairman of the Executive Committee: Joseph A. Hoffman, President: Joseph T. Beaudin, Group Vice President and Manager, Industrial Publications: Frank T. Lauinger, Vice President/Finance and Administration. Electric Light & Power editorial offices are located at 1250 S. Grove Avenue, Barrington, IL 60010. Phone: (708) 382-2450. Circulation for executive and engineers in U.S. electric utilities and consulting engineering firms. Second-class postage paid at Tulsa, OK. Subscription: $36 per year in U.S.; $66 foreign. $108 foreign air mail. Single issue price $4 + postage. $1 + postage foreign. Change of address requests are available only if both old and new addresses include zip codes. Mail to: EL&P, 1421 S. Sheridan Road, Tulsa, OK 74112. Allow 60 days for change. Postmaster: Send address changes to ELECTRIC LIGHT & POWER, P.O. Box 2086, Tulsa, OK 74101.

VBPA ABP

Advertiser and advertising agency assume liability for all content (including text representation and illustrations) of advertisements printed, and also assume responsibility for any claims arising therefrom made against the publisher. It is the advertiser's or agency's responsibility to obtain appropriate releases of any name or individuals pictured in the advertisement.

Study indicates merger feasible

DENVER—The proposed merger between Colorado-Ute Electric Association and Tri-State G&T Association "is technically, economically and financially viable," and should be pursued, according to a report by Stone & Webster Management Consultants.

Colorado-Ute Chairman Joe deGanahl II and Tri-State President Hub Thompson expressed to the 38 member systems of the proposed combined organization, "The study solidly sets forth several very positive findings, particularly that a merger between the two cooperatives would result in a substantial cumulative present-worth savings of nearly $300 million in 15 years.

The study results were presented to the merger committee Feb. 1 at Tri-State's Denver headquarters. According to the study, "The proposed merger generates savings each year through the study period (1990-2004) and the present worth of these savings through the 15-year period is $293 million.

Reducing the peak load for the combined systems provides the source of greatest potential for merger synergy, according to Stone & Webster. Colorado-Ute is a winter peaking system while Tri-State is a summer peaking system.

In a combined operational mode, the 1990 annual system peak would be reduced by 203 MW which could then be made available for additional off-system sales. Stone & Webster modeled off-system sales prospects into its analysis. Several firm surplus sales contracts are currently in place, while the potential for others also exists.

Under a merger scenario, "Additional revenues are envisioned that are associated with capacity payments for a seasonal unit commitment sale that will be possible due to the combined resources. These revenues range from $1 million to $64 million per year for the 15-year study period.

The study suggests a split rate initially and gradually developing a single rate of about 4.2¢/kWh by 2001. Currently, Tri-State's average wholesale rate to its member systems is about 4.0¢/kWh while Colorado-Ute's is 4.48¢/kWh. Thompson and deGanahl said, "These benefits reflect combining the organizations and all of their member systems as they exist today. Members of the merger committee and our staffs are actively pursuing these possibilities."

Proposed merged member service areas of Colorado-Ute Electric Assn. and Tri-State G&T Assn.

from page 1

Fiscal year '91 budget...

cost-competitive renewable energy can contribute both to a better environment and reduced U.S. oil imports." More sustained progress is needed in these areas with federal leadership, especially in deployment of advanced lighting technology.

Among renewable sources, "we need to reestablish United States leadership in photovoltaics technology by developing cooperative efforts with the domestic industry."

Of the budget, $3.8 billion goes toward the broad category of "Respecting the Environment," up from $2.7 billion in FY90. The increase is primarily due to the Environmental Restoration and Waste Management Five-Year Plan, to cover previous DOE environmental neglect at various facilities.

The funding request for "Fortifying Foundations," or science and technology, increased to $2.3 billion from $2.1 billion, including $318 million for the Super Collider.

DOE national defense portion, including the Strategic Petroleum Reserve, increases from $8.5 billion to $9.2 billion.

More strategy and the budget

NES findings will be integrated into the department's budget in FY91, more closely aligned in FY92 and fully integrated in FY93. An interim NES will be issued in April and a final version given to the president in December. The strategy will be updated annually.

According to the *EEI Washington Letter* summary, the FY91 budget proposal includes the following.

DOE numbers

Inside the DOE budget:

- Energy supply R&D also funds geothermal—$18 million, hydro—$1 million, up $1 million, electric energy systems—$27.4 million, up $9.5 million, electric storage systems—$12.9 million, up $900,000.
- Clean coal technology has $1.356 billion available as follows: FY91—$256 million, FY92—$400 million, FY93—$475 million, FY94—$225 million.
- Nuclear waste fund dropped $2.7 million to $292.8 million.
- Fossil R&D cuts more than half to $202.3 million from $243 million. It deletes the magnetohydrodynamic (MHD) generator (an advanced device for producing electric power using hot, partially ionized gases), cutting $40.4 million. Fuel cells dropped $31.9 million to $7.1 million.
- Power marketing agencies (PMA) include SEPA, $9.285 million (in half), with legislation to be proposed to sell the Administration's exclusive power marketing rights to existing customers; SWPA—$20.1 million, down $5 million; and WAPA—$298.5 million, up $4 million.

Legislation is also planned to revise PMA power repayment rules. In FY91, this would bring in an added $87.2 million from SEPA, $63.7 million from SWPA, $144.1 million from WAPA; and $590.4 million from BPA.

Environmental Protection Agency funds total $5.6 billion.

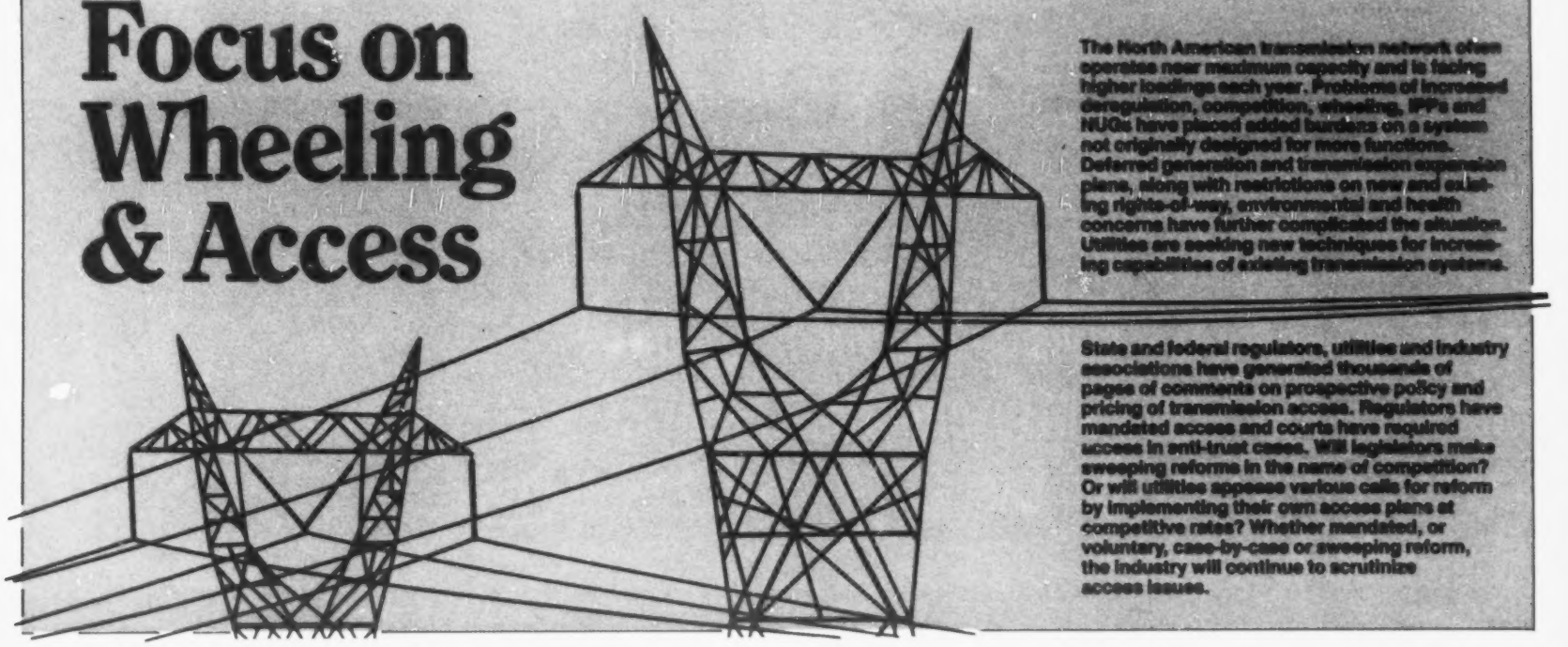
Nuclear Regulatory Commission asked for an increase of $23 million to $475 million. That includes recovery of 33 percent of NRC expenses through user fees, a drop from the 45 percent of this year. The Senate has denied the Administration's request for NRC user fees of 100 percent, but a push is expected in this direction.

The Federal Energy Regulatory Commission seeks a $7.8 million increase to $122.7 million, all to come from regulatory fees.

Rural Electrification Administration total electric loan programs would decrease by $1.59 billion.

The Department of Health and Human Services includes $1.05 billion for the Low-Income Home Energy Assistance Program, down $343 million.

Focus on Wheeling & Access



The North American transmission network often operates near maximum capacity and is facing higher loadings each year. Problems of increased deregulation, competition, wheeling, IPPs and NUGs have placed added burdens on a system not originally designed for more functions. Deferred generation and transmission expansion plans, along with restrictions on new and existing rights-of-way, environmental and health concerns have further complicated the situation. Utilities are seeking new techniques for increasing capabilities of existing transmission systems.

State and federal regulators, utilities and industry associations have generated thousands of pages of comments on prospective policy and pricing of transmission access. Regulators have mandated access and courts have required access in anti-trust cases. Will legislators make sweeping reforms in the name of competition? Or will utilities appease various calls for reform by implementing their own access plans at competitive rates? Whether mandated, or voluntary, case-by-case or sweeping reform, the industry will continue to scrutinize access issues.

Transmission systems do have technical limits

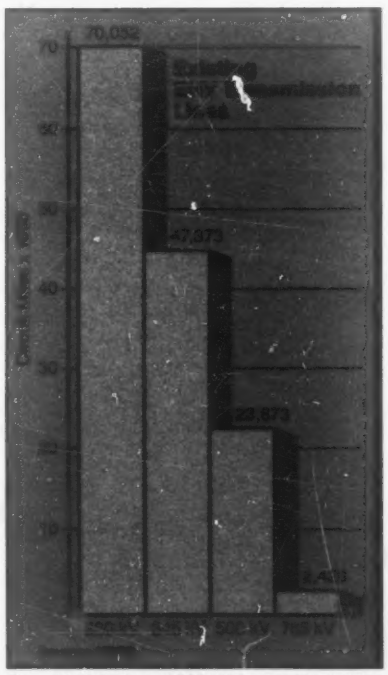
Wayne Beaty
Senior Editor—T&D

The electric transmission system in the U.S. has evolved into one of the most complex "machines" ever devised by man. Starting over a century ago as small neighborhood radial distribution circuits supplying power and lights to homes and factories, they have grown into a tremendously complex, interconnected network linking generation facilities with customers throughout the U.S. and with interconnections to Canada.

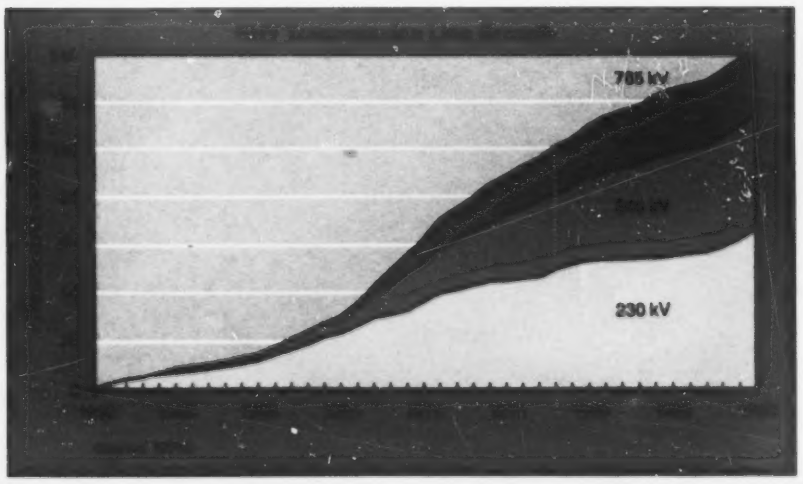
Interconnections among utilities first began in the early 1920s to improve the reliability of their systems. There were over 4000 utilities by then and some sales and power exchanges reached across state lines. Uncle Sam stepped in and ruled that state commissions could not regulate interstate sales. The establishment of the Federal Power Commission [predecessor to the Federal Energy Regulatory Commission (FERC)] was—among other things—to "promote and encourage...interconnection and coordination" among utilities selling interstate power.

Advances in transmission and control technology led to further physical integration of transmission systems.

Continued on page 13



Over 70,000 miles of 230-kV lines existed at the end of 1989 but since power capacity quadruples as the voltage doubles, interest in upgrading to higher voltage systems is growing.



Extra-high-voltage (EHV) transmission line construction accelerated after the '65 Northeast blackout.

Politics, pricing, policies, complicate access issues

Mark T. Hoske
News Editor

Industry views on transmission policies are fractured down untraditional lines because of the myriad regional, economic and competitive differences of the players. The nation's utilities again appear poised to enter a building cycle in the mid- and late 1990s that will challenge transmission planners and policy makers to incorporate increased reliance on non-utility power, and allow power purchases and wheeling from utilities that risk building baseload plants.

With increased emphasis on world markets and energy use, increased access and wheeling could allow customers, and utilities, a chance to shop for the best deal. But talk of customers "shopping around" has many utilities agonizing over long-term planning, reliability and their obligation to serve.

Year	Sales for Resale	Interchange Out	Transmission Delivered
1961	87	37	10
1966	143	74	22
1971	208	178	50
1976	291	220	71
1981	348	332	119
1982	318	348	121
1983	332	331	139
1984	338	342	171
1985	369	378	167
1986	390	367	139
1987	338	291	141

"Deliveries" fell more than "sales" after 1985, perhaps showing less grid availability.

Thousands of pages of testimony, press releases, hundreds of conference sessions and debates, innovative contracts, court cases, and trend-setting regulatory decisions have shaped transmission policy so far. Some of the major views are summarized below.

Transmission Task Force report

The Federal Energy Regulatory Commission, which governs pricing issues for interstate transmission, is coming up to speed again after a recent turnover of commissioners.

Prior to the turnover, then-commissioner Charles Stalon led the FERC transmission task force that submitted a 355-page report last October. The report was called a comprehensive effort to gather and digest information. It was made to stimulate discussion on the topic, but it stops short of a direct transmission access recommendation to the commission.

Voltage kV	Costs ($000) per mile	Capacity SIL*	Costs $ per SIL-mile
138	125-375	100	1,250-3,750
230	125-375	276	453-1,359
345	200-550	820	244-671
500	400-575	1,664	240-341
765	600-740	4,038	110-183

Source: TAG - Technical Assessment Guide, Vol. 1: Electric Supply - 1988, EPRI, December 1988, P281-...

Without recovering line-expansion costs, utilities could incur significant expense.

It does say, however, that current policies are unlikely to allow efficient investments in generation assets and probably not in transmission assets. "One particular option, the emergence of a competitive generation sector, may be frustrated by the lack of coherent transmission pricing and access policy," the report concludes.

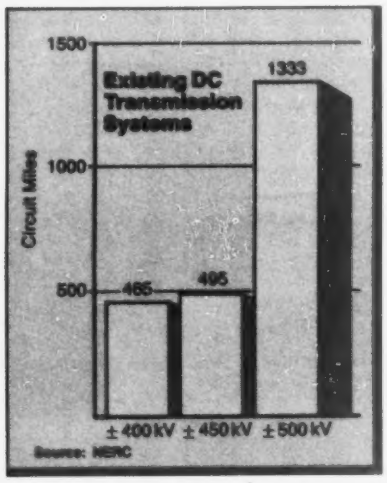
Independent power producers will not endure a financial risk of building new plant if transmission access is not assured. "Without transmission reform, the potential efficiencies of a competitive generation sector will not be

Continued on page 14

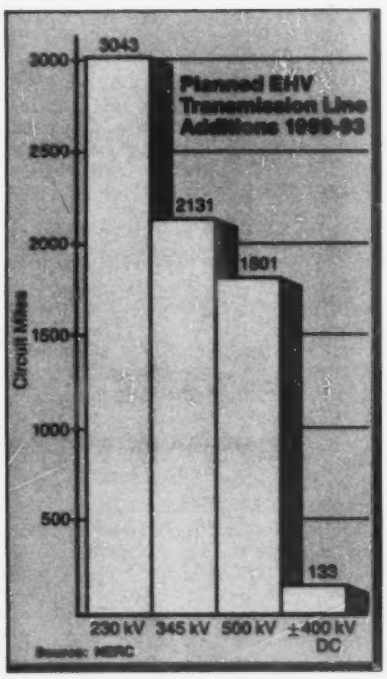
The development of high-speed, large memory computers in the last four decades has contributed enormously to the interconnection of utility systems.

Blackout changes things

The increasing interconnection of transmission systems is immediately evident in the growth of extra high voltage (EHV) systems rated at 230 kV and above which really took off following the 1965 Northeast blackout (see Fig. 1).



HVDC lines will play an important role in power transfer as well as system stability in the future.



Planned additions to transmission systems are subject to delays because of siting and other environmental problems.

A few EHV lines were built in the 1940s and 1950s, but the network expanded rapidly beginning in the 1960s (see Figs. 2-4). Although it is claimed by some that transmission networks were designed for reliability alone, surveys made in 1964 and 1970 by the Federal Power Commission (FPC) revealed that efficient use of resources and cost reduction also were important factors considered by the designers of EHV networks.

After an extensive study of the circumstances of the 1965 blackout, the FPC formed an industry-wide committee to develop general guidelines and criteria for transmission system design and operation.

This effort evolved into regional reliability councils and the North American Electric Reliability Council (NERC). The principal purpose for these nine regional councils and NERC is to create, promulgate and enforce operating standards for the grids.

Focus
On Wheeling and Access

North America's interconnected systems create four physically separate, synchronously operated transmission networks (see Fig. 5): the Eastern Interconnection, includes seven of the nine regions; the Texas Interconnection; the Western Systems Coordinating Council; and the Hydro Quebec System.

The dc and ac interties between these interconnections are limited in location and capacity. The barriers between them limit the market areas for power exchange. For example, there is little opportunity to transfer power from relatively low-cost power areas to higher cost power areas.

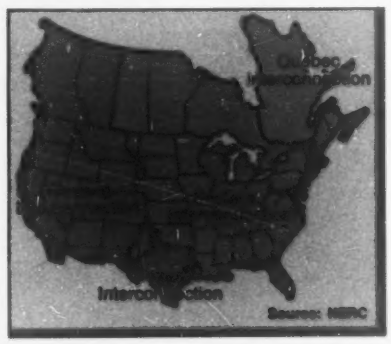
Although it would be possible to construct ac-dc-ac interties to permit greater power flow between regions, there are sound technical reasons for maintaining separate networks.

Focus on transmission

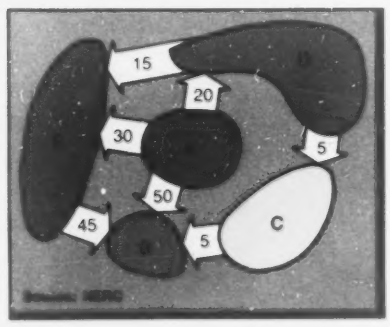
Transmission systems have become a focus today because of several factors including:

- Production cost differentials among utilities and regions that make capacity and energy exchange desirable.
- Difficulty in justifying building new generating units, especially when it might be cheaper to purchase power from others.
- Emergence of non-utility generators (NUGs) and independent power producers (IPPs) promulgated by the Public Utility Regulatory Policies Act of 1979 (PURPA).
- Regulatory changes by the FERC which may encourage more competition among utilities and other electricity suppliers.

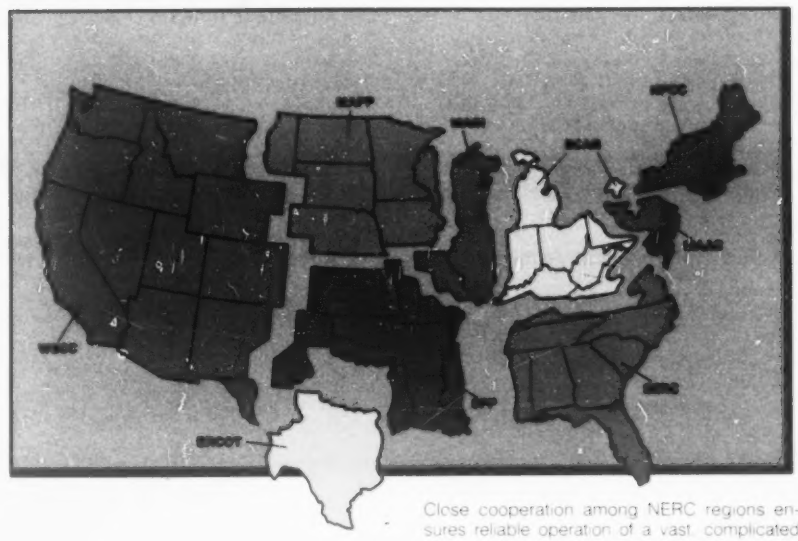
Since electricity has become such an integral part of our lives, many take its availability for granted. But the complex network of generation, transmission lines, substations and other facilities that make this power available to us was carefully designed by engineers to perform definite tasks within prescribed limitations.



Four major interconnected regions comprise the North American Electric Reliability Council (NERC) to facilitate energy exchanges and maintain system stability.



Energy interchanges among regions may take multiple paths by following laws of physics—not contractual agreements.



Close cooperation among NERC regions ensures reliable operation of a vast, complicated network of generation and transmission systems. Plans are underway to make it even more reliable and able to withstand abnormal conditions.

Today, that system is being called upon to operate under challenging conditions not originally conceived because of the changing business environment. Increased fuel prices, capital costs, environmental constraints and regulatory restrictions have all placed a heavy burden on the system and its designers.

Transmission systems are designed and built to reliably deliver electricity to distribution systems. Reliability is enhanced by connecting utility systems together. The connection also provides a means to exchange electricity between systems when one area might have a surplus and another area a deficit.

Electric networks are different

Electric networks are not like pipeline systems and even less like telephone networks. In every other business, the delivery of commodities can be routed and switched over selected paths to a specific delivery point. The dispatcher of electricity however, has no choice in deciding the path. In effect, every generator is connected to every customer.

The "path" is determined by Kirchoff's laws and laws of physics, not contracts between supplier and customer. When a light is turned on, or a motor is started, or a computer switched on, the electric systems must respond instantaneously and the current may flow over all available paths.

As electricity transfers increase, they may use up the transfer capability of already heavily loaded portions of the system and the capability planned for future load growth, and, in the extreme, overload critical facilities.

Control areas

Utilities schedule electricity interchanges through control areas with each of the NERC regions (see Fig 6). Not all electric utilities can schedule electricity interchanges. To do so, a utility must have generating units of sufficient size and number; be able to monitor the interchange; and be able to control a sufficient number of its generating units so its actual interchange equals its scheduled interchange. This ensures that its customers' demands are being met.

A utility or group of utilities that can schedule interchanges is called a control area and they are controlled by procedures outlined in NERC's Operating Guides.

Although most electric utility systems are interconnected only with neighboring systems, in reality, they are indirectly connected to all systems. For example, if a load of 100 MW is being transferred from Control Area A to Control Area B (Fig. 6) half of it might flow directly from A to B and half through the three other interconnected control areas.

There are 150 such control areas in North America and Canada that control nearly 100 percent of the electricity generated in each of the nine NERC regions.

Regional status

The managers and dispatchers in each of the NERC regions stress that transmission lines are built for specific purposes, and problems arise when those systems are called upon to perform functions not originally intended.

Bob Woodward, manager of the Pennsylvania-Jersey-Maryland (PJM) power pool—a part of the Mid-Atlantic Area Council (MAAC) region—says, "The primary criteria for our system is to optimize economic transfer." The MAAC transmission network operates well above 90-percent utilization and has since 1981 when this measure of system use was instituted. Woodward says there are some local problems at times, especially when the generated power comes from the eastern Hydro Quebec area.

Woodward adds, "We could use a few more lines but there is only an incremental benefit from any one new line." MAAC is still awaiting completion of the 500-kV Washington-Baltimore loop which has been tied up in court actions for years.

The impact of increased wheeling on system reliability continues to be a major concern to Southeastern Electric Reliability Council (SERC) members, although the region continues to voluntarily participate in capacity transfers among utilities located within or interconnected with SERC. These transactions involve both economy energy and capacity exchanges.

Chuck Winn, administrative manager, SERC, says the region was able to handle the recent winter ice storm that affected Florida by using rotating blackouts. The four consecutive days of subfreezing weather was unusual for Florida, and even though the region hit its 1996 projected winter peak, there was no real danger of system instability.

Winn pointed out that the SERC region is in its fifth consecutive year of increased winter peaks.

Chisna Fleming, vice chairman of NERC's Reliability Assessment Subcommittee, says, "There are a few 'bottlenecks' in the various transmission regions but through proper planning and operation, the problems are minimized." Fleming points out that planning and construction lead times for new transmission lines are still quite lengthy. For example, he cited a

Continued on page 31

fairly tested."

The recommendations say:

- The commission needs to design or affirm policies to efficiently accommodate the industry's need for new power plants by attracting independent power producers.
- FERC should ask Congress for the authority to prevent transmission owners and/or state regulators from withholding existing transmission capacity or refusing to add needed new capacity. Or the FERC could ask owners to mitigate their market power and state regulators to relegate parochial interests as needed to accommodate a long-term firm transmission transaction over a congested transmission corridor. This still could allow decentralized planning, the report said; however, state regulators often express concern of losing power to federal regulators.
- "Regulatory frameworks are needed to create pricing discipline and allow participants to react quickly to changing market conditions."
- Flexibility in regulation over the past 15 years' excess capacity market may not be appropriate during the next 15 years of tighter capacity. Although generation is no longer a natural monopoly, transmission essentially is. Regulation "should be tailored to these new realities."
- Transmission debate today is no longer focused on utilities' concern for providing captive customers access while recouping the transmission line investment. With the debate shifted to building power plants, the industry is no longer united against transmission reform, the report stated.

The report also contains summaries of the various industry views including policy recommendations or transmission proposals from the Edison Electric Institute; American Public Power Association; Pacific Gas & Electric Co.; Transmission Access Policy Study group, a public power interest; ELCON, a group of large electricity users; Large Public Power Council, a group of 17 large public power systems; Utility Working Group, made up of 12 investor-owned utilities; and the "Group of 5," investor-owned utilities. (See the summary table on transmission positions.)

Average Wheeling Revenues for 15 Major Wheeling Utilities in 1987

	Gigawatt Hours Delivered	Total Revenue (Millions $)	Average Rate m/kWh
1. Pacific Gas & Electric	8,098	16.3	2.01
2. Maine Electric Power	5,841	3.8	0.65
3. Vermont Electric Power	5,321	16.1	3.03
4. Gulf States Utilities	5,090	18.2	3.58
5. Florida Power & Light	4,881	21.9	4.49
6. Public Service of Indiana	3,716	7.9	2.13
7. Idaho Power	3,223	3.8	1.18
8. Boston Edison	3,086	8.8	2.85
9. Utah Power & Light	3,008	7.7	2.56
10. Consolidated Edison	2,939	9.7	3.30
11. Montana Power	2,822	5.9	2.09
12. Delmarva Power & Light	2,406	0.7	0.31
13. Mississippi Power & Light	2,361	7.9	3.36
14. Portland General Electric	2,261	3.1	1.37
15. Virginia Electric & Power	2,159	8.6	3.98
Total	57,212	140.2	2.5

Source: Transmission account data from 1987 FERC Form #1.

No apparent relationship emerges between average wheeling rates and amount of power delivered by 15 major investor-owned utilities. Other factors, including regulation, available external power sources, and system demand may have more impact on wheeling transactions.

Summary of Transmission Positions

Issue	FERC	TAPS	APPA	ELCON	PG&E	MSU	EEI
Access and Price of Transmission	• No formal position • In Turlock and Modesto Commission required average system cost service sufficient to meet projected load, but permitted flexible pricing for coordination service where market power had been mitigated	• Maximum use of FERC (and state) authority to compel wheeling at non discriminatory rates	• FERC should have workable authority to order transmission service on fair and non discriminatory terms to all industry sectors	• FERC and the States should have authority to order wheeling • FERC should set rates based on cost of service	• Cost based (long run marginal) rates for transmission sufficient to mitigate market power for first contract period • Flexible pricing for coordination service when market power has been mitigated • Transmission provided point-to-point	• Flexible pricing for all non retail transactions • No linkage to bulk power supply contracts • No exclusion of subsidized entities	• Maintain current system of voluntary access • Pricing flexibility is needed for non-firm transmission service. Cost is appropriate basis for price of firm service if no facility upgrade is needed.
Cost of Upgrades	• No position • Suggestion in Utah Power and Light case that the cost of upgrades may be assigned to party requesting service, but such costs subsequently might be allocated to other beneficiaries of additional capacity	• Customer option to invest in new facilities • FERC and States should promote joint planning	• Upgrades and additions planned on regional basis with price and access provided on just and reasonable terms	• Intrastate defined by contract path • Commissions should order additions and upgrades • Net costs attributable to applicant are borne by that applicant	• Incremental cost of upgrades should be borne by party requesting upgrades • No ownership rights	• Same as PG&E except not limited to only meet reliability needs	• Cost of upgrading transmission should be case specific, but not assigned solely to the owners.
Obligation to Serve	• Commission will not permit termination of service to captive customers • Customers who have voluntarily arranged to leave host utility, assume risk of "best efforts" service • Rate for "best efforts" service need not be based on embedded cost or the charge for service in a market where seller lacks market power	• Customer should have option of continuing requirements service, using wheeling to transfer req. service to a new supplier, or use wheeling to obtain new sources of supply under own planning regime • If customer leaves, then no automatic right to return	• Same as TAPS	• Customers who cease firm service then desire to re-establish firm service should be viewed as new customers	• No extra-contractual obligation to serve • Additional service provided at expiration of contract is placed at the margin	• Same as PG&E	• No obligation to provide longer term, firm service • Utility customers should not subsidize transmission services for third parties.
Competition	• More recent decisions indicate the Commission believes control of transmission confers market power	• Open access at embedded cost rates could allow relaxation of regulation of power and energy sales in areas of vigorous competition	• Same as TAPS	• Must have guaranteed access to multiple markets • Utility and non utility generators should competitively bid	• Proposed Sufficiency Conditions must be met to demonstrate market power of wheeling utility has been mitigated	• Same as PG&E except with development of service plan by host utility and purchaser States or FERC arbitrate	• Recent competitive procurement of power supplies has demonstrated significant interest and competition within the existing regulatory framework.

Source: APPA, EEI, FERC.

Focus On Wheeling and Access

New FERC chairman's position

Martin L. Allday, new commissioner replacing Martha Hesse as FERC chairman, recently said he supports open access transmission measures that discourage owners of transmission facilities from using ownership to exercise market control over generation.

Further, he suggested that future FERC decisions should carefully define legal rationale.

EEI opposes wheeling cash

In various statements, including a series of monographs on transmission issues, the Edison Electric Institute has stated that open access—unrestricted customer wheeling—would break down the obligation to serve, utilities' ability to supply power, and lead to an overall breakdown in the industry and the nation's economy.

EEI maintains that the nature of the system can't allow true competition—generating resources are too expensive for owners to risk building them if the market for their power is not available. Any gains from open access would be from short-term profit-takers, the group noted. (Another EEI resource on the topic is "Transmission Access and Wheeling: a Summary of State Laws and Regulation.")

Standing industry rulings/policy

Merger activity has prompted a look at transmission access arrangements and market power. The FERC approval for the PacifiCorp/Utah Power & Light merger was conditioned on an access agreement.

FERC staff and various other parties have suggested that the approval of the proposed Southern California Edison Co./San Diego Gas & Electric Co. merger also might be conditioned on transmission access for other utilities. Staff argued that the merged utility could exercise significant market power over California cities served by SCE without mandated firm service.

In addition, several parties involved in the Northeast Utilities Co. buyout of Public Service Co. of New Hampshire indicated that transaction may include an access arrangement.

Transmission as a profit center

With utilities closely watching costs and seeking new ways to generate additional revenue, some—like Ashley Brown, chairman of the Ohio Public Utilities Commission—suggest using transmission as a profit center.

A recent example of a utility wheeling proposal is Public Service Co. of Indiana's FERC request for market-based pricing for a capacity sale in trade for offering transmission access.

PSI wants to offer long-term firm transmission service to all utilities, qualifying facilities and independent power producers and sell up to 450 MW of long-term power at market-based rates.

PSI: market pricing, open access

The transmission service would be priced at embedded cost—$1.05/kW/month—if no system modifications are necessary.

Nonfirm transmission pricing is more complex: PSI's applicable losses, plus 1 mill/kWh for difficult-to-quantify costs, plus up to one-third of total net savings resulting from the transaction, calculated as the difference between the seller's incremental costs and the buyer's decremental costs.

Utilities requesting transmission service must agree to provide similar service to PSI. The rates for the power sale would be at, or below, the purchasing utility's avoided cost for alternative service. Purchasers would be only those utilities not now PSI captive customers.

The proposal also includes the following conditions:

- The purchaser must be an eligible customer, except for full-requirements customers.
- The sale must be at least for five years and negotiated at arm's length.
- The purchaser must certify that the negotiated price does not exceed the purchaser's alternative cost of power.

If needed, PSI agreed to construct additional transmission facilities to be paid for by the purchaser.

In response to this, the commission said its objective is to increase competition and find a proposed market-oriented rate that's just and reasonable under Federal Power Act standards.

This rate should fall within a "zone of reasonableness," bounded at one end by the investor interest against confiscation and at the other end by the consumer interest against excessive rates. FERC said it anticipates that certain conditions would be attached to the rate, expected to take effect May 24.

Various utilities, interest groups and regulators have intervened. The FERC docket number is ER89-672-000.

Siting and expansion

Although the transmission system

Continued on page 15

from page 14

Focus on Wheeling and Access...

has been steadily growing, planners haven't had as much difficulty in siting new lines as debate may suggest, according to the FERC task force report. The report pointed out that the total of NERC Reliability Assessment-troubled lines totaled about 100 circuit miles of transmission, compared to several thousand miles added every year. While that doesn't lessen the concern for project delays, the problems seem small compared to overall success.

In addition, many more siting requests are approved than denied, according to a 1986 National Governors' Association Task Force survey of state regulators.

Transmission service pricing has varied components. FERC now uses an average embedded-cost method for firm transmission service. But some suggest the incremental cost of building should be used as basis for firm service in some cases.

Health effects

Another component of transmission politics and policy is EMF, or electric and magnetic fields, which could restrict growth and siting of future transmission lines and increase access and wheeling prices.

Not-in-my-backyard (NIMBY) opposition has long challenged project siting through densely populated areas. Recent studies on EMF have given opponents more fuel for their disputes.

Previously only a side component in transmission policy, EMF is getting increased attention with a challenge to a Florida law limiting transmission capacity. Also, recent widely reported studies linking telephone workers' EMF exposure with cancer has increased electric utilities' attention on the matter.

William A. Badger, chairman of the Electricity Committee of the National Association of Regulatory Utility Commissioners, pointed out to health leaders in January that "because the evidence is still inconclusive, we believe the matter requires further study."

Badger said despite extensive studies by the Electric Power Research Institute and others, an expanded federal research effort is needed. His comments were in a letter to the National Cancer Institute, the National Institute of Environmental Health Sciences, the National Institutes of Occupational Safety and Health, and the Environmental Protection Agency.

Antitrust cases

Antitrust cases have directed transmission policy as well. Even with sweeping federal or state policies, these cases would continue to provide the industry guidance. In addition, greater competition may lead to changes that limit utilities' coordinating transmission and generation facilities.

PURPA, PUHCA, other policy tie-ins

Power pools, wheeling agreements and FERC filings for bulk power purchases have abounded for years. But during discussion about changing the industry's competitive nature, municipal utilities, cooperatives, wholesale utility customers and investor-owned utilities seek to better market position to best serve customers.

When industry reform is mentioned, transmission access is not far behind. Policymakers could encourage competition and remove disincentives in the bulk power market by modifying the Federal Power Act and the Public Utility Holding Company Act of 1935 (PUHCA).

APPA and NRECA have expressed concern that recent legislation to revise PUHCA could create new classes of competition that would squeeze co-ops and municipals out of the picture. Proponents insist, however, that all interests would be protected and the market best served with such revisions.

PS New Mexico seeks ownership clarification

ALBUQUERQUE, NM—Public Service Co. of New Mexico petitioned a U.S. district court to confirm its ownership of the lines and poles the company built on public rights-of-way belonging to the City of Albuquerque. At the time of the request, the city council was considering property takeover without consent.

The utility defended its service.

"We repeatedly are charged with having the highest rates in the region," said Bill Eglinton, chief operating officer. "In fact, 18 electricity suppliers inside New Mexico have higher rates than we do. And, I can assure you that a City-owned and operated utility will have higher rates, too."

Wisconsin Electric trims rates again

MILWAUKEE—Wisconsin Electric Power Co. lowered retail electric rates 2.9 percent, $29.7 million, the ninth decrease since 1983.

"This decrease," said WE Senior Vice President Dave Porter, "reflects the results of energy-efficiency improvements by our customers and continued cost-reduction efforts by our employees."

The Wisconsin Public Service Commission approved the Jan. 12 decrease, and a 1.2-percent steam rate increase for 500 downtown customers.

NUS forms nuclear information service

CLEARWATER, FL—NUS Corp. formed the Nuclear Issues Information Service (NIIS) to provide present and emerging regulatory news to clients.

NIIS is based on two 10-year-old NUS services, Nuclear Safety Issues Review and Nuclear Ratemaking Review.

For more information, contact NUS Corp.'s Pete Jordan at (813) 796-2264.

EVERYTHING IS BIGGER IN TEXAS?
LCRA, LaGrange, Texas
451 MW 100,000 lbs.
HASTELLOY alloy C-22 for the
30" x 30" x 120" long outlet duct
Absorber plant no.1
Absorber plant no.2
Absorber plant no.3
Bypass for absorber plant no.2
Bypass for absorber plant no.3
Bypass for absorber plant no.4
Bypass for absorber plant no.5
Bypass for absorber plant no.6
From absorber plant no.5
From absorber plant no. 6
Flue lining
HASTELLOY alloy C-22

National Power, U.K. Drax Station
4,000 MW >1,000,000 lbs.
HASTELLOY alloy C-22 for the
30" dia. x 1 mile (5280') outlet duct

RELIABILITY:

Over 25 U.S.A. FGD Systems chose HASTELLOY® alloy C-22 based on performance and value.

HASTELLOY® alloy C-22 Performance

- *Best weld corrosion resistance, highly improved filler weld material*
- *Best uniform corrosion resistance important when trace NO_x is present*
- *Best pitting resistance when sulfur compounds and halide ions (e.g. Cl^-) are present*

Haynes International's Performance

- *Quality HASTELLOY alloy pacesetter for industry standards*
- *75 years experience in manufacturing and competent technical support*
- *Complete inventory integrated customer service system*

Hastelloy is a registered trademark of Haynes International, Inc.

Tony Nicholas
FGD Market Manager
Tel. (317) 456-6095
FAX (317) 456-6905

HAYNES
International

P.O. Box 9013
1020 W. Park Avenue
Kokomo, Indiana 46904-9013

Inquire R.S. 5

from page 13

Focus on Wheeling and Access...

planned 12-mile 138-kV line which, if started today, would take until mid-1994 for completion.

Fleming adds, "Usually the immediate problems brought on by system limitations can be overcome by using phase shifters and capacitors, but these are short-term solutions. Sooner or later additional generation and transmission lines will have to be built."

Technical problems

Transmission systems have technical limits since they were designed for specific purposes and have only limited capability to take on additional duties. An Electric Power Research Report (EL-6549) points out four traditional functions for all transmission systems and the emergence of two additional ones.

First, about 85 to 90 percent of all transmission lines are built to deliver power from generators to load centers—the most basic of purposes.

Second, about 10 to 15 percent of lines are built to facilitate reserve sharing. Since the organization of power pools—begun in the 1920s and accelerated in the 1960s—utilities have interconnected transmission systems to reduce investment in power plant capacity. The introduction of EHV and UHV voltages of 345 kV, 500 kV, and 765 kV helped greatly in this effort.

Third, economic interchange of power among utilities within a power pool can reduce overall costs. Such sales of power over lines already in place are usually adjusted on an hourly basis because of the changes in the mix of loads within each utility system throughout the day.

Fourth, about 2 to 5 percent of transmission lines are added to a network to increase the reliability of the electric power supply for a region. NERC considers reliability to be of primary importance in planning transmission systems.

Each day, it is common for some of the thousands of operating generators and transmission lines to be taken out of service. Seldom, however, do the lights go out. It's the transmission system, with network configurations, operating reserve, and the ability of the system operator to control and coordinate generation dispatch during system emergencies, that keep customer's electric service reliable.

In addition to these four well-established functions for transmission systems, two other functions are emerging.

The first of these is wheeling of power, as distinguished from the direct interchange of power for economic purposes between two utilities. Wheeling means that a utility allows its transmission lines to be used to transfer power between two other parties and the utility owning the transmission line may not be directly involved in the transaction.

The second is third-party access in which non-utility generators, cogenerators, and small independent power producers negotiate with the transmission line owner to transmit power from producer to user.

Transmission operation

Utilities constantly monitor their transmission systems to assure that line loadings are kept within proper limits. There must be sufficient capacity in the system to allow for probable outages.

In addition to weather-related outages, thermal limits of the lines must be considered in order to stay within design limits and prevent problems. Limits on current flow are set to prevent overheating and sagging. Improvements in relaying and monitoring equipment have helped keep this potential problem at bay.

Protective equipment can isolate a fault or short circuit within a few cycles to prevent excessive damage. When a line or section of line must be isolated, the remaining parts of the system must be able to carry the added load.

If parts of a transmission system are thermally constrained, some remedial measures might be to replace the conductor with larger ones with higher thermal capacity. A temporary measure might be to revise the relaying scheme to trip the circuit prior to excessive overheating.

Another solution might be to add another conductor to an existing one in a bundle. In some cases, this might mean that towers and crossarms need to be strengthened to account for the extra weight.

Voltage limits

A power system is designed to operate at a nominal voltage within a certain bandwidth—usually 5 to 10 percent above and below the nominal voltage. The most effective way to obtain more power transfer capacity over a given line is to increase the voltage.

Since power transfer capability increases as the square of the voltage, doubling the voltage results in a quadrupling of capacity. Many transmission lines built prior to the 1960s, had very conservative designs and in many cases, midspan clearances are such that they could operate at higher voltage and still maintain code clearances.

Whether or not a particular line could economically be upgraded and the voltage raised depended upon whether changes to the substations—changing transformers, circuit breakers, and other similar equipment—could be made economically.

Stability considerations

In an alternating current (ac) network, all generators rotate in unison, or synchronism, at a frequency of 60 Hz. The ability to maintain a constant frequency is a measure of the stability of the system.

Normally, a system disturbance will cause small changes in the power output, which tends to bring that generator back to the common speed of the

Continued on page 33

Meyer Industries introduces a new service...

LIGHT-DUTY STEEL POLES IN 3 TO 4 WEEKS. GUARANTEED!

Now there's no need to tie up inventory dollars or yard space. No need to worry about delivery on short-term projects. We'll ship LD Steel Poles from stock to meet your target dates.

We've standardized the engineering on ten classes of LD Steel Poles in lengths from 60 to 110 feet. You get the traditional advantages of steel over wood—longer spans, less weight and minimum maintenance—plus a new advantage. Delivery in 3 to 4 weeks! For a free brochure, write or call today.

AMERICAN ELECTRIC
STEEL STRUCTURES GROUP
MEYER INDUSTRIES
ANCHOR METALS

Inquire R.S. 16

from page 31

Focus on Wheeling and Access

system. Stability limitations may appear in a variety of forms throughout the system. The transmission system plays a part in maintaining system stability. Various control schemes and monitoring equipment are used.

One method by which reliability and safety may be preserved is to generate power at particular locations without regard to economic dispatch. A second way may be to change the transmission network itself by disconnecting one end of a constraining line—usually limited by low voltage. The line then carries only the loads directly connected to it. The tradeoff is lower reliability since the load now has only one path from the generator.

Phase shifting is another method to control power flow. Power flow can be altered by changing the phase angle between the input and output voltages by using a phase shifting transformer or regulator. These devices act as a valve to increase or decrease power flow.

These have not been widely used because of reliability problems.

A technique called rapid adjustment of network impedance (RANI) can be used to continuously vary VAR compensation to maximize the power flow on a particular line. The Bonneville Power Administration is experimenting with RANI, and in a preliminary study the system compared favorably with switched shunt capacitors, static VAR compensators (SVC), and switched series capacitors on the Pacific Intertie in providing transient stability.

Role of dc

High-voltage direct current (HVDC) lines are used between the four interconnected BPA regions to provide asynchronous connections. Power transfer can be directly controlled through dc lines and may enhance stability as well.

According to a study made for Congress by the Office of Technology Assessment, HVDC appears to be the single most powerful method of direct flow control in the battery of options. If this method proves to be economically feasible, it could have a major impact on the industry.

The increased use of HVDC has been made possible by developments in high-power semiconductors to allow electronic rather than mechanical controls in converting ac power to HVDC and back to ac again. Individual power semiconductors or thyristors have been developed that can carry up to 3,000 amperes at 6 kV. When combined in series and parallel, power carrying capabilities of thousands of megawatts at up to 500 kV are now being achieved.

The thyristors used in this arrangement are sufficiently expensive that HVDC lines are only practical for lines that are long enough to bear the high terminal cost or as interconnections between asynchronous systems.

What's ahead

In the midst of a lot of uncertainty about what lies ahead for system designers and operators, lies a vision of an advanced transmission system that will be needed to cope with increasingly demanding conditions.

EPRI is developing a system called FACTS (Flexible AC Transmission System) that would overcome loop-flow problems and provide a more sophisticated degree of control through a combination of high-power electronic devices and computerized system automation.

Specifically, large solid-state switches, or thyristors, would be used in various types of controllers to manipulate ac current flow on transmission lines. With such a system, utilities would be able to increase the loading on existing transmission lines and handle more transactions without compromising reliability.

EPRI has launched a seven-year, $20-million research program devoted to FACTS. The project will be developed in two phases. The first will evaluate the technical and economic benefits and develop design specifications for specific power control devices. The thermal performance of present transmission systems also will be evaluated and overall control strategies developed.

The second phase, expected to start this year, involves developing hardware and demonstration tests on utility systems. Frank Young, director, electrical systems division for EPRI, says, "We need to follow a systems approach to FACTS. Although it could be implemented piecemeal, the pieces have to fit together. By the time prototypes of phase angle transformers and modular series capacitors are ready for demonstration, the strategies for integrating them into a transmission system must also be available."

from page 32

Long-life cable...

earth or installed in conduit.

To help member utilities prepare specifications for improved cables, EPRI has compiled valuable information into one easy-to-use digest (EL 6271-Distribution Cable Research Digest). It covers specifications for long-life cable, discusses economic considerations, and summarizes various completed cable research projects.

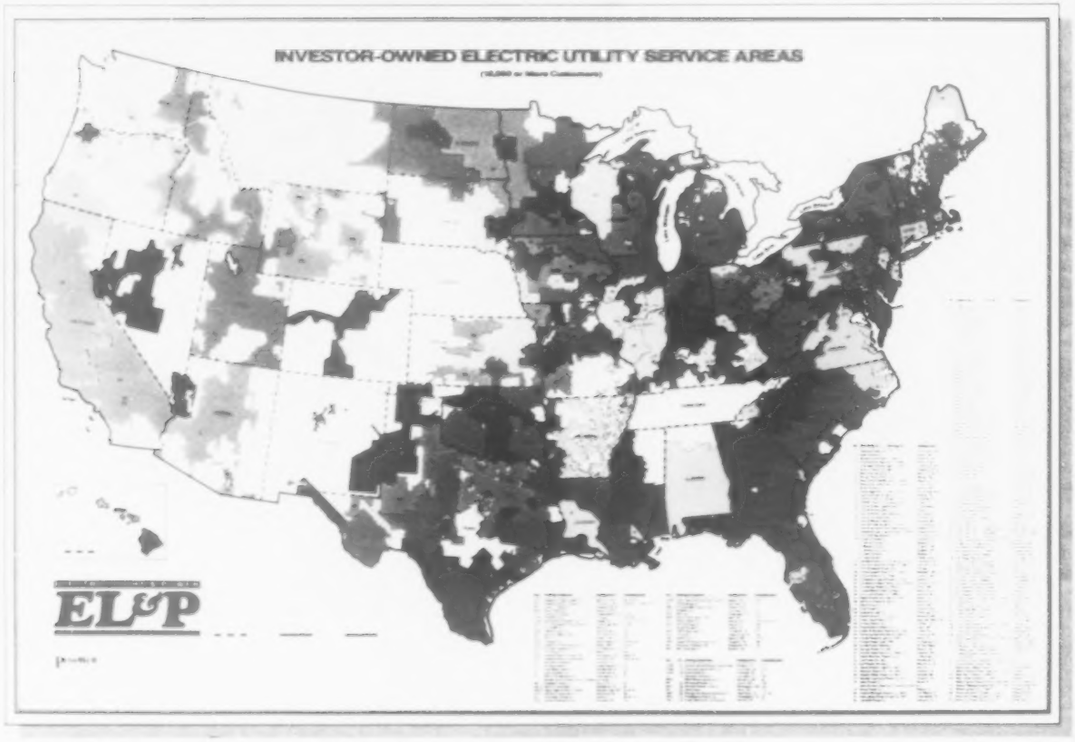
Case study

The cable-selection program has been sent to about 30 utilities. One utility that has used the economic analysis program reports that it incorporated investment costs, energy losses and replacement costs in its analysis. The results indicated that XLPTR distribution cable was the most economic for each of four aluminum cable sizes—#2, #2/0, 500 kcmil, and 1000 kcmil.

Jacketed cable

This study addressed only treeing—not concentric neutral corrosion—and the utility points out that a serious corrosion problem could make jacketed cable an economically justified option.

EL&P Wall Map
of Investor-Owned Electric Utility Service Areas



Just Revised and Updated with New Data

EL&P's new 1990 poster size wall map, printed in six colors, identifies service areas for U.S. electric utilities with 10,000 or more customers. All holding, owning and operating companies are featured.

Cross-Referenced Listings

Three separate lists are printed on the map and cross-referenced: 1. holding companies, 2. owning companies, 3. operating companies. In addition, the holding and owning companies are followed by the number of their operating subsidiaries. Each company has the location of its headquarters listed.

Ideal for Framing

The full-color, poster size map measures 23" x 34" and is ideal for framing. Your local art supply store offers easy to assemble frames that fit the exact measurements of the EL&P Map. Add a certificate backing and you have an attractive, current marketing map for your office or home.

Price Schedule

Individual copies of the EL&P New 1990 Map are $15.00 including postage and handling in the U.S.

Quantity Discounts

10 to 24 copies ..... $ 12.00 each
25 to 49 copies ..... $ 10.00 each
50 or more copies sold to one customer ..... $ 8.00 each

To obtain, complete the form and send with check made payable to:
EL&P Map to: EL&P Map
Attn: Carmen Archer
P.O. Box 1260, Tulsa, OK 74101

Please send ..... EL&P Maps at $15.00 each
Payment is enclosed for $ .....
NOTE: Make checks payable to EL&P Map

Name .....
Company .....
Address .....
City ..... State ..... Zip .....

1990 MAP

ELEP PennWell

NOTE

ONLY THE FOLLOWING PAGES OF THIS

PUBLICATION HAVE BEEN FILMED

Cov. 1, Pgs: 2, 4